Current trends in the sprint hurdle events

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1 Introduction

Performance development in the men's and women's sprint hurdle events between 1985 and 1989 nearly matched the predictions for 1988 which were made by experts from the GDR. The predictions made and the World Records as they stood at the end of 1989 are given in Table 1. Performance development during this period is shown in Figures 1 and 2 (see the following pages).

The performance dynamics of the last five years have featured a total of six improvements in the women's 100 metres Hurdles World Record, which has now been reduced to 12.21 by Yordanka Donkova (BUL). In the men's 110 metres Hurdles a period of relative stagnation at the very top level was ended when Roger Kingdom (USA) lowered the eight-year-old World Record to 12.92 in 1989.

These developments are due to the following factors affecting the performance state of the athletes:
- The variety and complexity of event- and competition-specific abilities;
- the developmental state of performance determining factors;
- a high basic potential for load tolerance in the strength, speed and speed endurance complex;
- individuality and stability of technique;
- mobilization of personality factors and psychological traits relating to competition.

The tendencies towards improvement witnessed in recent years can be expected to continue, particularly in the women's event, leading us to the following predic-
Figure 1 - Performance development 100 metres Hurdles 1985 - 1990

Figure 2 - Performance development 110 metres Hurdles 1985 - 1990
Table 1

<table>
<thead>
<tr>
<th>Event</th>
<th>Prediction for 1988</th>
<th>World Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's 100 metres Hurdles</td>
<td>12.25</td>
<td>12.21 (1988)</td>
</tr>
</tbody>
</table>

Table 2 shows the partial performances which will be necessary for athletes to meet the predictions made.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurdle 1</td>
<td>2.47</td>
<td>2.54</td>
</tr>
<tr>
<td>Hurdle 3</td>
<td>4.44</td>
<td>4.58</td>
</tr>
<tr>
<td>Hurdle 5</td>
<td>6.32</td>
<td>6.58</td>
</tr>
<tr>
<td>Hurdle 7</td>
<td>8.21</td>
<td>8.55</td>
</tr>
<tr>
<td>Hurdle 9</td>
<td>10.14</td>
<td>10.56</td>
</tr>
<tr>
<td>Hurdle 2 to Hurdle 5</td>
<td>0.95</td>
<td>1.00</td>
</tr>
<tr>
<td>Hurdle 7 to Hurdle 10</td>
<td>0.97</td>
<td>1.00</td>
</tr>
<tr>
<td>Hurdle 10 to Finish</td>
<td>1.05</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Table 3 gives parameters over flat distances which hurdlers should be able to achieve in order to meet the predictions made.

The above analyses lead to consideration of the training structure of elite sprint hurdlers and determination of potential means for improvement, including training methodology, of the main parameters of performance structure.

At the highest levels of performance it is, of course, not possible to propose a generalized training structure, as training advice for world-class athletes must be highly individualized. However, based on analyses of the training and competition of top hurdlers, we can point to the following priorities:

- increase in specificity of loading;
- increase in the training build-up both over one year and several years;
- concentration on the key parameters of physical conditioning and technical coordination.

Improvement in the structure of training and performance and the specific training methods to be employed will be discussed below, together with a few remarks on the key parameters mentioned above.

2 Performance and training structures

The women's and men's sprint hurdle races are repeated sequences of acyclical movement segments. They include 11 separate short accelerations. Transitions from running between the hurdles to the hurdle clearance stride and back to running...
between hurdles are of particular importance. In contrast to flat sprinting, in which the achievement of optimal stride length and frequency are not dependent on external constraints, the fixed hurdle spacing (8.5m for women, 9.14m for men) imposes limits on the athlete's stride pattern. The distance available for the three strides which are taken between hurdles is further restricted after the optimal distances for the take-off and landing of the hurdle clearance stride are subtracted.

Because of this space restriction, an increase in velocity (the maximum normally achieved is 9.0 m/sec. for women and 9.3 m/sec. for men) is possible only through an increase in stride frequency between hurdles. The complexity of the movement form which is characteristic of the sprint hurdle races is increased by the fact that each of the three strides between the hurdles is different in terms of stride length and movement structure.

Concentration on the runs in the 9 segments between the hurdles seems to be justified as 50% of a performance can be attributed to this part of the race, whereas 20% can be attributed to the 10 hurdle clearances and the remaining 30% to the initial acceleration and final run-in. This, however, does not mean that top athletes should neglect possibilities for improving their hurdle clearance technique. In addition, the hurdle-specific performance structure must be reflected in the training structure through work on a combination of physical as well as co-ordination and technical factors.

Among the physical factors, the development of performance over flat distances is an important prerequisite for development in the hurdles, as the physical characteristics affecting flat sprinting are also important for the sprint hurdles. Secondly, the specific strength characteristics (maximum strength - speed strength - strength endurance) must be emphasized, not only because of their obvious importance for conditioning but because they represent an area in which improvement has the potential to lead to a development of overall performance in the sprint hurdles. En-
hancement of these characteristics will have the following effects on important aspects of the sprint hurdles:
- control of the vertical action in the amortization phases (support phases) of the hurdle clearance stride;
- shortening of the support phases of the strides between hurdles;
- improvement in acceleration to the first hurdle;
- improvement in the ability to perform repeated accelerations in the sections between hurdles.

Whilst there is an undeniable relationship between physical factors and improvement in the sprint hurdles events, the transference of improvements in the relevant characteristics to performance development is not automatic. The decisive link is the co-ordination and technical factor. This characteristic, however, must be developed in parallel with development of the physical characteristics. In other words, improvements of co-ordination and technical abilities are only possible on the basis of improvement of physical characteristics.

The following criteria for improvements in the co-ordination and technical area should be mentioned:
1. As a matter of principle, the development of technique should take place all year round and should be suited to the intensities and velocities which develop during the course of the year.
2. When selecting technical exercises, concentration should be on the phases and characteristics of competition technique which determine the effectiveness of the strength effort and are decisive for the movement rhythm.
3. Partial movements must, as far as possible, be co-ordinated within the framework of the total movement, and should not be trained in isolation over a long period.
4. Technical deficits should not be compensated for by a forced development of the physical characteristics.
5. As the standard of performance of the athlete increases, concentration should be on only a few, effective technical exercises.

In addition to the physical characteristics, the anthropometric factors as far as hurdle clearance is concerned should be taken into account. This is particularly true in the men's event. Depending on the athlete's body height and 100 metres performance, there are three main hurdle clearance techniques which can be employed. These techniques and their characteristics are as follows:

- **Swing style (SS)**
  - pronounced forward lean of the body;
  - active work of the lead leg;
  - slightly bent lead leg during hurdle clearance.

- **Running style (RS)**
  - medium forward lean of the body;
  - extended lead leg during hurdle clearance.

- **Take-off style (TS)**
  - upright body posture;
  - extended and fixed lead leg, with tip of the foot drawn towards the body.

In Table 4 the appropriate hurdle clearance technique for male hurdlers with

### Table 4

<table>
<thead>
<tr>
<th>Height (m)</th>
<th>Personal best over 100 metres (sec.)</th>
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<tbody>
<tr>
<td></td>
<td>&lt; 10.5</td>
</tr>
<tr>
<td>1.87 and taller</td>
<td>SS</td>
</tr>
<tr>
<td>1.77-1.86</td>
<td>RS</td>
</tr>
<tr>
<td>1.76 and shorter</td>
<td>TS</td>
</tr>
</tbody>
</table>
given height and speed characteristics are shown (Balakhnishev, 1981).

3 Training-methodical implications

Given the above, the following training implications can be noted:

1. When developing the physical characteristics, special emphasis must be placed on the specific strength characteristics. This will lead to improved acceleration, shorter ground contact times and greater stability in the amortization phases.

2. To achieve an increase in stride frequency when running between hurdles, stride-rate-orientated training is required. Fast runs over the flat distance will also contribute to an increase in stride rate.

3. Throughout the year, training should be characterized by high velocities both over flat distances and over hurdles. To achieve this, training methods which put a high load on the neuromuscular system should be employed.

4. Overall increases in load specificity, and in the intensity of special training methods, require a more careful observance of the regeneration intervals between the training sessions. In some cases this can lead to a reduction in training volume or training intensity.

5. Competition activity must be expanded and competition frequency must be increased. To a high degree, competitions should be integrated into the overall preparation.

6. When developing individual hurdling technique, the athlete’s anthropometric characteristics as well as physical and co-ordination abilities must be taken into account.

REFERENCES